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IS 8088 (1976): Tricycle, Hand Propelled [MHD 10: Medical Laboratory Instruments]



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REAFFIRMED 2008

IS: 8088 - 1976

Indian Standard
SPECIFICATION FOR
TRICYCLE, HAND PROPELLED

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INDIAN STANDARDS INSTITUTION

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI 110002

September 1976

Indian Standard

SPECIFICATION FOR TRICYCLE, HAND PROPELLED

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AMENDMENT NO. 1 SEPTEMBER 1984

TO

IS:8088-1976 SPECIFICATION FOR TRICYCLE,
HAND PROPELLED

Alterations

(Page 4, clause 4.3, line 2) - Add the following
between the words 'thickness' and 'mounted':

•conforming to IS:303-1975 Specification for plywood
for general purposes (second revision)'. .

(Page 7, clause 5.4, line 7) - Substitute 'of
12 mm wide conforming to IS:7298-1973 Specification for
for cotton webbing proofed and unproofed' for the words
'sufficiently strong'.

(Page 9, clause 7.1, first sentence) - Substitute
the following for the existing sentence:

'Each tricycle shall be road tested by riding with a
load of 1 KN at footrest to a minimum distance of
1.5 km at speed of 8 to 10 km/h.'

(CPDC 20)

Reprography Unit, ISI, New Delhi, India

AMENDMENT NO. 2 APRIL 2012
TO
IS 8088 : 1976 SPECIFICATION FOR TRICYCLE, HAND PROPELLED

(Page 4, clause 4.3) — Add the following matter after the existing clause:

- ‘a) Seat : Seat shall have base of wooden planks of not less than 10 mm thickness mounted on a wooden frame.
- or
- Seat shall have sheet metal base having minimum 1 mm thickness suitably formed.
- b) Backrest : Backrest shall have plywood support of 3 mm thickness minimum mounted on a wooden frame and the rear side of the backrest shall be covered with plywood of minimum 3 mm thickness.
- or
- Backrest shall have seat metal support having minimum 1 mm thickness suitably formed.’

(Page 4, clause 4.4) — Add the following matter after the existing clause:

- “a) Footrest : Footrest shall be made from mild steel (M.S.) sheet of minimum thickness 2 mm duly embossed or from mild steel (M.S.) Chequered sheet of minimum thickness 2 mm (excluding raising portion) or from rigid PVC of minimum thickness 3 mm have strength conforming to IS 6307 : 1985 ‘Specification for rigid PVC sheets.
- b) Seat walls : Seat walls shall be made from mild steel CRA sheet conforming to Grade ‘O’ of IS 513 : 2008 ‘Cold-rolled low carbon steel sheets and strips’ having a minimum 1 mm thickness or from suitable plastic material having a minimum 3 mm thickness.
- c) Tool Box : Tool box shall be made from galvanized iron (G.I.) sheet of minimum thickness 0.3 mm.”

(Page 6, clause 5.1) — Substitute the following for the existing clause:

‘The frame shall be made from steel tubing. Diameters and thickness of various sizes of tubing employed shall be as indicated in Fig. 1. The end portion of the tubes shall be radius cropped and shall be joined by welding/brazing. The frame assembly shall be sound and of robust construction. There shall be no sharp edges or unsealed formations.’

(Page 7, clause 5.5, second sentence) — Substitute the following for existing sentence:

‘The front mudguard shall be provided with a steel stay made from 4 mm diameter wire.’

(Page 8, clause 5.18) — Add the following matter after the existing clause:

If required by purchaser, a head light assembly, hand pump and one red reflector on the front side mudguard.’

(Page 9, clause 6.2) — Add the following matter after the existing clause:

“All the metallic parts other than those mentioned in 6.1 shall have smooth finish and shall be zinc plated in accordance with Grade 1 of IS 1573 : 1986 ‘Specification for electroplated coatings of zinc on iron and steel’.”

Indian Standard
SPECIFICATION FOR
TRICYCLE, HAND PROPELLED

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 May 1976, after the draft finalized by the Artificial Limbs Sectional Committee had been approved by the Consumer Products and Medical Instruments Division Council.

0.2 As the hand propelled tricycles are to be used by invalids having different stature and with varied form of disabilities of lower extremities, all the dimensions cannot be fixed. Therefore, keeping with the policy of the institution not to restrict the improvements in design and at the same time to ensure interchangeability of replaceable components, only the essential dimensions have been specified.

0.3 In the preparation of this standard, the Sectional Committee concerned has kept in view the manufacturing and trade practices followed in the country in this field.

0.4 This standard contains clauses which permit the purchaser to use his option for selection to suit his requirements. The relevant clauses are **5.6, 5.7, 5.12** and **5.15**. The clauses **6.1** and **9.1** call for an agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the overall dimensions and functional requirements for hand propelled tricycles used as conveyance by invalids having disability of lower extremities. It does not include power driven tricycles.

2. NOMENCLATURE

2.1 For the purpose of this standard, the nomenclature of various parts as given in Fig. 1 and IS : 3398-1966† shall apply.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms used in the bicycle industry.

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3. SHAPE AND DIMENSIONS

3.1 The typical shape and dimensions of the tricycle shall be as shown in Fig. 1 and Table 1.

TABLE 1 DIMENSIONS OF HAND PROPELLED TRICYCLE	
NOMENCLATURE	SIZE
Overall length	1 960
Overall width	890
Overall height	990
Width of footrest	320
Length of footrest	600
Clearance of footrest from ground	120
Armrest height from seat	225
Seat length	600
Seat width	430
Back height from seat	320
Length of steering handle	420
Height of rear wheel supporting frame	385
Leverage of steering handle	5 : 1

4. MATERIAL

4.1 **Tubing** — The tube used in the framework of tricycle shall conform to ERW quality specified in IS : 2039-1964*.

4.2 **Standard Tricycle Components** — Standard components used in the fabrication of tricycle shall be made to the relevant Indian Standards on bicycle components. List of relevant Indian Standards on bicycle components is given in Appendix A.

4.3 **Seat and Backrest** — These shall have plywood base of minimum 8 mm thickness mounted on a wooden frame and shall be padded with foam rubber cushioning or other equally suitable material and covered with vinyl coated fabrics (leather cloth) conforming to IS : 1259-1962†.

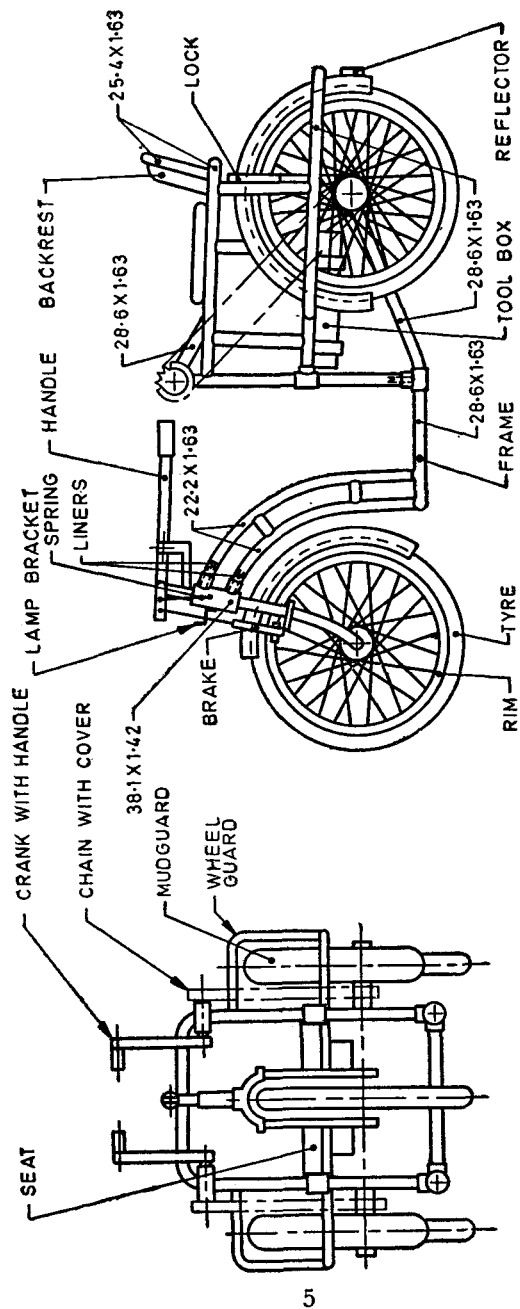
4.4 **Footrests, Seat Walls and Tool Box** — These shall be made from mild steel sheet conforming to Grade 3 of IS : 277-1969‡ having a minimum thickness of 1.25 mm. The footrest may also be made from aluminium alloy sheet of 2.00 mm thickness conforming to Designation 31000 or 31500 of IS : 737-1974§.

*Specification for steel tubes for bicycle and allied purposes.

†Specification for vinyl coated fabrics (leather cloth) (*revised*).

‡Specification for galvanized steel sheets (plain and corrugated) (*second revision*).

§Specification for wrought aluminium and aluminium alloys, sheet and strip (for general engineering purposes) (*second revision*).



All dimensions in millimetres.

FIG. 1 'TRICYCLE, HAND PROPELLED, TYPICAL

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4.5 Spring Wire — Spring wire used in the brake assembly shall conform to IS : 4454 (Part I)-1975*.

4.6 All other metallic components shall be of mild steel.

4.7 Timber—Timber for seat frame, armrests and other parts shall be seasoned heartwood of any of species of timbers specified for furniture and cabinet making in IS: 399-1963†. Heartwood of non-durable timbers and sapwood, if present, shall be given a suitable treatment in accordance with IS : 401-1967‡. Timber used shall be free from prohibited defects and it shall have not more than the permissible defects as prescribed in IS : 1331-1971 § for Grade I timber for non-structural use. Permissible moisture content in timber shall be as recommended in IS : 287-1973||.

4.8 Bearing Balls — The ball bearings shall conform to Grade 00 of IS: 2898-1965¶.

5. REQUIREMENTS

5.1 Frame — The frame shall be made from steel tubing. Diameters and thickness of various sizes of tubing employed shall be as indicated in Fig. 1. The tubes shall be fitted squarely to their respective lugs with liners as shown in the figure and shall be joined by brazing. The requirements for lugs and liners shall be same as given in IS : 623-1963**. The frame assembly shall be sound and of robust construction. There shall be no sharp edges or unsealed formations.

5.2 Steering Handle Bar — The steering handle bar shall be of lever type, fitted to the head tube and it shall be of such length as can be conveniently held by the driver without drooping ahead. The handle shall be light to manoeuvre and it shall have a suitable plastics or rubber hand grip at its holding end to facilitate proper gripping. It shall be pivoted at 5 : 1 length towards the other end which shall have a toggle joint for connecting with the front brakes.

5.3 Tyres and Tubes — Tyres used shall be 28 × 1½ size heavy duty type conforming to IS : 2414-1969†† while tubes shall conform to IS : 2415-1969‡‡.

*Specification for steel wire for cold formed springs: Part I Patented and cold drawn steel wires — unalloyed (*first revision*).

†Classification of commercial timbers and their zonal distribution (*revised*).

‡Code of practice for preservation of timber (*second revision*).

§Specification for cut sizes of timber (*second revision*).

||Recommendations for maximum permissible moisture content of timber used for different purposes (*second revision*).

¶Specification for chromium alloy steel balls.

**Specification for bicycle frames (*revised*).

††Specification for cycle tyres (*first revision*).

‡‡Specification for cycle rubber tubes (*first revision*).

5.4 Wheel Rims — Wheel rims for the tricycle shall be Type A, size $28 \times 1\frac{1}{2}$ conforming to IS : 624-1975*. They shall be free from pitting or uneven plating. Spoke-holes shall be properly punched or drilled. The spokes shall be of 2.00 mm nominal diameter and shall conform to IS : 630-1961†. There shall be 32 spokes in the front wheel and 40 spokes in each of the rear wheels. When assembled, the spokes shall cross without touching each other. A canvas tape sufficiently strong shall be wrapped around the rim, over riveting of spokes, to protect the tube being damaged by heads of spokes.

5.5 Mudguards — They shall be made from mild steel sheets, properly formed 'open type' with beaded edges. The front mudguard shall be provided with a steel stay made from 4.8 mm diameter wire. It shall extend 150 mm beyond the forks whereas the rear mudguard shall extend 75 mm below the wheel stay on each side. A clearance of not less than 25 mm shall be provided between mudguards and the tyres and a clearance of minimum 10 mm between the wheel and fork shall be given. The mudguards shall be free from dents and other defects.

5.6 Brakes — Usual brakes shall be provided to the front wheel of the tricycle which shall be capable of applying by pressing the steering handle bar downwards. However, if required by the purchaser, brakes may be provided to each of the rear wheels too, with suitable means of applying brakes to both the wheels simultaneously. Brakes shall be effective and light to operate.

5.7 Sprocket and Free Wheel — The tricycle shall be provided with one set of sprocket and free wheel on each side such that on left hand side the sprocket shall be of 18 teeth and free wheel of 22 teeth. Whereas on right hand side sprocket shall be of 22 teeth and free wheel of 18 teeth. The above arrangement can be otherwise also at the option of the purchaser. The sprocket welded integral with a hub shall be mounted along with a crank of 175 mm length (centre to centre) on an axle which shall rest in the bottom bracket on two ball cup bearings (*see* IS : 1131-1968 to IS : 1134-1968‡). The height of the bottom bracket shall be so kept that while cranking, maximum height of elbow does not go above the level of the shoulder.

5.8 Front Wheel Hub — Front wheel hub assembly shall be standard unit, with each end of the hub provided with cup and cone type ball bearings. Bearings and races shall be hardened and polished. Provision shall be made for adjustment of the front wheel bearing assembly and positive locking after adjustment.

*Specification for bicycle rims (*revised*).

†Specification for spokes (plain) and nipples for spokes (*revised*).

‡Specification for bicycle bottom bracket assembly components (axle, adjustable ball cup, fixed ball cup, and lock ring) (*first revision*).

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5.9 Rear Wheel Hub — Rear wheel hub assembly shall be standard unit and shall be mounted on the axle by means of cup and cone type ball bearings provided at each end of the hub. Bearings shall be hardened and ground. Provision for adjustment of the bearing shall be integral to the assembly and positive locking after adjustment shall be made.

5.10 Drive Chain — shall conform to Designation 083-1 of IS : 2403-1975*.

5.11 Chain Cover — Each of the two drive chains shall be provided with chain covers suitably mounted so as to give adequate protection to the operator and his clothing from contact with drive sprocket and drive chain. The drive chain shall not touch the chain cover at any place during operation.

5.12 Seat and Armrests — The seat and the armrests at its two sides shall be properly built so as to provide maximum comfort to the person driving the tricycle. The armrests shall not interfere the arms while cranking. The armrests shall be provided with adequate foam rubber padding all over on top if so required by the purchaser.

5.13 Tool Box — A drawer type tool-cum-accessories box with suitable means for locking shall be provided at the underside of the seat.

5.14 Lock — A cycle lock conforming to IS: 6799-1972† or any other suitable locking arrangement shall be provided on any one of the rear wheels, to prevent the movement of tricycle when not in use.

5.15 Hood — If required by the purchaser, a suitable hood may be provided to the tricycle for protection against sun and rain. The hood shall be folding type and attached firmly to the tricycle in a manner convenient for the user to fold and unfold it.

5.16 Lubrication — All moving parts of the equipment normally requiring lubrication shall be provided with means for such lubrication.

5.17 Suitable means shall be provided on the underside of the tricycle for keeping the crutches or walking stick securely and conveniently.

5.18 Accessories — The following items shall be furnished as accessories:

- a) Horn or bell,
- b) Head light assembly,
- c) Set of tools,
- d) Hand pump, and
- e) Red reflectors on each mudguard at the rear.

*Specification for transmission steel roller chains and chain wheel (*first revision*).

†Specification for locks, bicycle.

5.19 Servicing and Adjustment — Prior to the delivery of the tricycle, the supplier shall service and adjust each tricycle for operational use, including atleast the following:

- a) Adjustment of braking system;
- b) Alignment of wheels;
- c) Inflation of tyres and complete lubrication of operating mechanisms; and
- d) Handicapped sign to be prominently displayed at the front and the back.

6. FINISH

6.1 The frame of the tricycle and mudguards, prior to assembly, shall be thoroughly cleaned by suitable means to remove rust, scale and oily substances. These shall be then chemically rust-proofed and stove-enamelled, spray-painted or otherwise finished to give a glossy finish. The colour of the finish shall be as agreed to between the purchaser and the supplier.

6.2 All the metallic parts other than those mentioned in **6.1** shall have a smooth finish and shall be plated chromium over nickel in accordance with Service Grade No. 3 of IS : 1068-1968*.

7. TESTS

7.1 Road Test — Each tricycle shall be road tested by riding a minimum distance of 1.5 km at speeds of 8 to 10 km/h. Travel shall include, but not be limited to, level unimproved roads for testing. All the components as well as the tricycle shall be intact and no part shall be loosened on completion of the test.

7.2 Manoeuvrability — The tricycle shall be operated at moderate speeds and shall turn and steer without difficulty of operation, structural or component failure.

7.3 Static Load Test — The tricycle selected for static load test shall be loaded as follows:

Place 50 kg weight at steering handle end, 50 kg at each of the crank handles, 100 kg at the footrest and 200 kg at the seat. The tricycle shall be subjected to this 450 kg load for not less than 15 minutes.

There shall be no damage after the test.

7.4 Brake Test — The tricycle selected shall be tested for stopping ability while travelling down on 8 percent dry hard surface gradient at 15 km/h and it shall stop within a distance of 10 m. It shall be capable of braking

*Specification for electroplated coatings of nickel and chromium on iron and steel (*first revision*).

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to full stop from a speed of 15 km/h within 8 m on a dry hard surface level road, free from loose dirt and gravel. The brakes shall be further tested for holding ability while descending a 200 m, 5-percent gradient. The brakes shall be able to maintain a constant speed within 3 km/h without overheating. The test shall be accomplished with a rider of 70 ± 5 kg weight.

7.5 Test for Finish—A solid steel ball of 13 mm diameter shall be dropped from a height of 1.5 m on any painted surface of the tricycle. The paint at the place where the steel ball strikes shall stand the impact without showing any sign of tear or peeling off.

8. MARKING

8.1 The tricycle shall be marked by putting a label or otherwise with the following:

- a) Manufacturer's name, initials or recognized trade-mark;
- b) Batch No. and date of manufacture; and
- c) Any special information regarding design or intended use.

8.1.1 The tricycle may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. PACKING

9.1 The packing shall be done as agreed to between the purchaser and the supplier.

A P P E N D I X A

(Clause 4.2)

RELEVANT INDIAN STANDARDS ON BICYCLE COMPONENTS

IS : 532-1964	Bicycle tube valve (<i>revised</i>)
IS : 624-1975	Bicycle rims (<i>second revision</i>)
IS : 629-1963	Bicycle hub assemblies (<i>revised</i>)

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- IS: 630-1961 Spokes (plain) and nipples for spokes (*revised*)
- IS : 960-1961 Bicycle rim tapes and buckles
- IS: 1131-1968 Bicycle bottom bracket assembly components
to (axle, adjustable ball cup, fixed ball cup
- IS : 1134-1968 and lock ring) (*first revision*)
- IS : 1281-1968 Bicycle cranks and chain wheels
- IS : 1282-1968 Bicycle cotter pins, washers and nuts (*first revision*)
- IS : 1283-1968 Bicycle free-wheels and chains (*first revision*)
- IS : 2061-1962 Bicycle front forks
- IS : 2973-1964 Bicycle steering head assembly
- IS : 3798-1966 Glossary of terms used in the bicycle industry

**INDIAN STANDARDS
ON
REHABILITATION EQUIPMENT**

IS:

- 5143-1969** Adjustable wooden crutches
- 5144-1969** Metal forearm crutches, (Canadian pattern)
- 5145-1969** Walking sticks
- 5150-1969** Rubber tips for crutches and walking sticks
- 5588-1970** Quadriceps boots
- 5665-1970** Shoulder wheel
- 5796-1970** Weight set, disc, for physio-therapy exercisers other than pulley arrangement
- 5827-1970** Paraffin wax bath
- 6069-1971** Sliding seat exerciser
- 6099-1971** Invalid walkers
- 6205-1971** Stationary cycle exerciser for adults
- 6302-1971** Whirlpool bath
- 6414-1972** Parallel walking bars, adult and child sizes, for the handicapped
- 6571-1972** Non-folding wheel chairs, institutional model
- 6809-1972** Fixed height walking frame
- 6810-1972** Metal tripod and tetrapod sticks
- 6979-1973** Cerebral palsy chair, tubular institutional model
- 6992-1973** Cerebral palsy chair, domestic model
- 7419-1974** Stairs and curbs
- 7454-1974** Folding wheel chair with removable armrests and swinging foot-rests

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